
GAIN Highlights
FY2019
GAIN
Gateway for Accelerated Innovation in Nuclear

FROM THE DIRECTOR

Over the past four years, the Gateway for Accelerated Innovation in Nuclear (GAIN) has become a trusted partner in our industry's quest to develop a new fleet of nuclear systems that deliver more than electricity. GAIN has helped private companies find the right resources (i.e., scientists, models, data, experiments) within the Department of Energy Office of Nuclear Energy (DOE-NE) national laboratory complex and execute work of specific interest to industry. These partnerships are evidence of the collaborative work carried out in 2019 around technology specific workshops, modernization for contracts/policy, and broad communication of funding opportunities .

Advanced nuclear energy is steadily gaining momentum. An example of this traction can be illustrated by the GAIN NE Voucher Program, which awarded 45 vouchers and completed work on 20 others totaling $14.7 million in DOE funds. However, we must keep our sights set on not only maintaining but increasing this momentum as the industry and DOE turn our collective attention to demonstrating advanced reactor technologies in the very near future.

Moreover, it is important to understand our common priorities and needs. A collaborative environment will reinforce successful demonstrations and build the necessary ecosystem that supports ultimate deployment of advanced reactors. GAIN will work across the industry with various stakeholders to ensure that we identify the work necessary to achieve this vision. By 2030, the U.S. nuclear industry will be equipped to lead the world in deployment of innovative nuclear technologies to supply urgently needed abundant clean energy both domestically and globally. It should be said that time is of the essence, and we have a narrow window to deliver. With this in mind, we will continue to identify processes and policies that allow us to initiate work quickly and look ahead to ensure we meet future needs.

As the new director, I am excited to be part of the GAIN team and thrilled to help industry deliver tangible results that support the commercialization of advanced nuclear reactors. As I reflect on where our industry is today and where we need to be headed tomorrow, I believe that some of the most crucial work will need to be done within the next five to 10 years. Our collective work will secure nuclear technologies for generations to come. I look forward to meeting each one of you and hearing your thoughts and perspectives on the nuclear technologies and the opportunities that we, as an industry, have in front of us.

May we support one another in realizing the nuclear future.

Christine King,
Director of GAIN

What is GAIN?

The Gateway for Accelerated Innovation in Nuclear (GAIN) was announced by DOE-NE at the White House in November 2015.

GAIN is a private-public partnership designed to give industry access to the capabilities and expertise throughout the DOE laboratory complex.

GAIN MISSION

Provide the nuclear energy industry with access to the technical, regulatory, and financial support necessary to move innovative nuclear energy technologies toward commercialization in an accelerated and cost-effective fashion.

GAIN VISION

By 2030, the U.S. nuclear industry will be equipped to lead the world in deployment of innovative nuclear technologies to supply urgently needed abundant clean energy both domestically and globally.

GAIN GOALS FOR FY 2019-2022

1. Provide nuclear industry entities access to financial support opportunities and national laboratory capabilities (facilities, expertise, experience and tools) to accelerate commercialization of innovations.
2. Work with industry to identify gaps, understand needs, and develop viable paths forward to remove barriers for industry and inform DOE research programs.
3. Support continued development of a regulatory framework for advanced reactor technologies.
4. Provide advanced nuclear industry entities access to legacy information to support their R&D and technology commercialization efforts.
5. Ensure the advanced nuclear technology industry is informed about opportunities and capabilities available throughout the DOE complex.

FY 2019 HIGHLIGHTS

GAIN is recognized as a critical enabler in advancing nuclear technology innovation toward commercialization within industry and DOE.

By participating in conferences, providing workshops, organizing outreach events and offering funding mechanisms, GAIN continues to expand its influence and reach new audiences.

Technical Highlights	Regulatory Highlights	Industry Engagement/Outreach Highlights

2018

OCT

Oak Ridge National Laboratory (ORNL) hosted the 2018 GAIN Molten Salt Reactor (MSR) workshop.

The Nuclear Science User Facilities (NSUF) Industry Advisory Meeting was hosted by the Electric Power Research Institute (EPRI) and organized by the Department of Energy Office of Nuclear Energy (DOE-NE), NSUF program and GAIN.

Teresa Krynicki, Lori Braase, John Jackson and Rita Baranwal staffed a booth at the Pacific Basin Nuclear Conference.

Rita Baranwal and Lori Braase toured the Kairos Power facility in Alameda, California. They discussed the GAIN NE Voucher Program and the industry funding opportunity announcement.

Lawrence Livermore National Laboratory (LLNL) officially joined the GAIN Team.

Rita Baranwal met with Maria Zuber, VP of Research at Massachusetts Institute of Technology (MIT), and Dennis Whyte, head of MIT's Nuclear Science and Engineering Department, to discuss GAIN and tour the MIT Reactor.

John Jackson was invited to speak at Colorado School of Mines for their graduate school seminar series.

Lori Braase provided a short GAIN overview to James Conca, consultant and Forbes contributor.

Lori Braase attended the Nuclear Energy Institute (NEI) International Uranium Fuel Seminar in Boston, Massachusetts.

John Jackson hosted a visit by NuScale Power to Idaho National Laboratory (INL). The visit objective was to understand capability that supports characterization of irradiation embrittlement in NuScale containment steels and to explore potential vehicles (GAIN, NSUF) for enabling interaction.

NOV

DOE awarded $18 million to 11 domestic advanced nuclear technology projects.

Five companies received GAIN NE vouchers under the GAIN initiative. The announcement was made during the same week as the American Nuclear Society (ANS) Winter Meeting.

The Senate Energy and Natural Resources Committee held a hearing for its newest nominees including the GAIN Director, Dr. Rita Baranwal, for the position of Assistant Secretary for Nuclear Energy in DOE.

INL selected GE Hitachi Nuclear Energy's PRISM technology to support DOE's Versatile Test Reactor (VTR) program.

Jim Kinsey, GAIN and Paul Demkowicz, Advanced Gas Reactor (AGR) Program, participated in a meeting at EPRI to review the content and major conclusions in the first draft of the topical report for TRISO particle fuel qualification, which is based on INL technical input from the AGR Program.

Rita Baranwal attended the EPRI Advanced Reactor Technical Advisory Group Meeting in Charlotte, North Carolina.

Rita Baranwal attended and chaired a plenary session at the G4SR-1, 1st International Conference in Ottawa, Canada.

Lori Braase, Alison Conner and John Jackson represented GAIN at the ANS Winter Meeting in Orlando, Florida. GAIN was one of many exhibitors during the event. John Jackson participated on a panel about a recent "Nuclear Futures" workshop.

Atomic Wings Lunch & Learn in Washington, D.C. John Jackson represented GAIN and INL as one of three panelists discussing private-public partnerships.

Rita Baranwal met with Southern Company R&D and toured the National Carbon Capture Center in Birmingham, Alabama.

DEC

Transatomic Power Corporation provided access to their now legacy intellectual property through the GAIN website.

The GAIN Advanced Manufacturing for Nuclear Workshop was held at ORNL in the Manufacturing Demonstration Facility.

The Nuclear Regulatory Commission (NRC) formally concurred with the proposed advanced non-LWR approach for allowing alternatives to large leak-tight containment structures. (See NRC SECY-18-0096.)

Rita Baranwal and Mark Peters (via video) participated in the first formal roundtable meeting, "Bridging the Gap to New Nuclear," hosted by ANS and the Hoover Institution.

Rita Baranwal and Lori Braase attended the NEI Advanced Reactor Working Group (ARWG) meeting in Washington, D.C.

John Jackson attended the ARPA-E Meitner Kickoff Meeting in Charlotte, North Carolina. ARPA-E and GAIN have initiated discussions on leveraging efforts in support of accelerating and enabling development of advanced nuclear power generation technology.

Rita Baranwal and Lori Braase participated in the NEAMS Advanced Reactor Industry Council meeting.

2019

JAN

President Donald Trump signed the Nuclear Energy Innovation and Modernization Act (NEIMA) into law (S. 512).

The EPRI/GAIN/NEI Workshop on Economics-Based R&D for Nuclear Power Construction was held Jan. 17-18, 2019, at NEI.

GAIN announced that three nuclear companies will be provided GAIN NE vouchers to accelerate the innovation and application of advanced nuclear technologies.

The GAIN initiative was announced as a winner of the United States Industry Council (USNIC) 2018 Trailblazer Meritorious Achievement Award.

John Jackson attended the Innovation X Lab Grid Modernization Summit meeting in Seattle, Washington.

The Advanced Reactor Summit VI and Technology Trailblazers Showcase was held in San Diego, California.

FEB

The inaugural Virtual Environment for Reactor Applications (VERA) Users Group Meeting was hosted at ORNL.

Kiel Holiday and Jason Jeffries from LLNL met with the GAIN team to discuss the GAIN NE Voucher Program and other collaborative opportunities.

The first edition of the GAIN University Directory was issued to highlight university capabilities that may be of interest to the advanced nuclear technology developers.

In order to increase engagement, GAIN provided overviews of the GAIN initiative and opportunities to INL staff.

Hussein Khalil participated in a "story mining" phone interview organized by the DOE-NE communications office. The interview focused on advanced nuclear technologies and GAIN's efforts to accelerate their commercial deployment.

MAR

The GAIN/EPRI/NEI Advanced Fuels and Materials Workshop was held at Boise State University.

Rita Baranwal and Hussein Khalil attended the NEI ARWG meeting in Bethesda, Maryland. Rita provided an overview of GAIN to the attendees.

Rita Baranwal and Hussein Khalil attended the annual Regulatory Information Conference (RIC) in Bethesda, Maryland.

Argonne National Laboratory (ANL) held a workshop to highlight mechanisms for lab personnel to support industry needs in various fields including nuclear energy.

Rita Baranwal joined a Nuclear Fission panel discussion at CERAWeek in Houston, Texas.

Rita Baranwal, Andy Worrall, Lori Braase, John Jackson and Hussein Khalil participated in Nuclear Innovation Week events (NEI R&D Summit and Nuclear Deployment Forum). Baranwal, Jackson and Khalil participated on panel sessions; GAIN organized a panel on the need for VTR, and GAIN supported the event with a booth in the exhibit area.

GAIN TEAM

Christine King: Current GAIN Director
Andy Worrall: GAIN Deputy Director
John Jackson: Technical Interface
Lori Braase: Program Manager
Hussein Khalil: GAIN Senior Advisor
Rita Baranwal: Previous GAIN Director
Teresa Krynicki: Administrative Assistant
Jim Kinsey: Regulatory Interface
Katelyn Morales: GAIN Communications
Alison Conner: GAIN Business Manager
Phyllis King: Analytics Support

APR

GAIN developed a pilot process to complete the necessary reviews of the recently released list of 12,000 Applied Technology documents.

John Jackson and Lori Braase won an INL Laboratory Director Vision Award for their dedication and hard work on the GAIN initiative.

Rita Baranwal presented at the MIT Energy Conference in Cambridge, Massachusetts.

Rita Baranwal presented at the ANS Student Conference in Richmond, Virginia.

Rita Baranwal, John Jackson and Lori Braase attended two workshops at the University of Michigan in Ann Arbor, Michigan.

- Fastest Path to Zero Summit at the Ross School of Business. Baranwal participated on a panel titled, "Reasons for Hope: What Technologies are we Excited About?"
- The "Un-Conference" at the Gerald Ford Library.

John Jackson attended the microreactor meeting at the University of Alaska in Anchorage, Alaska.

Rita Baranwal was the featured speaker at the Idaho Section of the ANS monthly meeting. She provided an overview of GAIN's accomplishments and interactions with DOE nuclear programs. This meeting was open to the community and provided a forum for open questions and answers.

Hussein Khalil attended the MIT symposium on innovations to support improved operation, maintenance and development/design of nuclear energy systems.

MAY

A workshop to Identify Initiating Events for Liquid-Fueled Molten Salt Reactor was a precursor to identifying licensing basis events.

The DOE-supported and industry-led team completed its work on TRISO particle fuel qualification and submitted that report to NRC with a request for formal review and issuance of a safety evaluation report.

GAIN organized a conference call with the DOE national lab points of contact. The purpose of the call was to discuss upcoming activities, review the GAIN-NE Voucher Program and request material for GAIN social media.

A Molten Salt Reactor Licensing Basis Event Workshop was held at ORNL.

The GAIN Executive Advisory Committee meeting was held in Washington, D.C., at the EPRI office. GAIN provided overviews of recent activities, workshops, advocacy efforts, vouchers and legacy documents.

Rita Baranwal, Lori Braase, John Jackson and Katelyn Morales visited Sandia National Laboratories (SNL). GAIN provided an overview of the GAIN initiative, the importance of collaboration and various communications media and a primer on the GAIN NE Voucher Program.

Rita Baranwal, Lori Braase, John Jackson and Katelyn Morales visited Los Alamos National Laboratory (LANL). The GAIN team provided an overview of the GAIN initiative, the importance of collaboration and various communications media and a primer on the GAIN-NE Voucher Program at a LANL Town Hall Meeting.

JUN

The GAIN/EPRI/NEI/USNIC Microreactor Workshop was held at the INL Meeting Center. The purpose of the workshop was to understand the unique needs of the microreactor industry, review DOE's microreactor activities and capabilities, and discuss the singular needs of the technology developers.

The U.S. Senate confirmed Dr. Rita Baranwal as Assistant Secretary for Nuclear Energy.

GAIN announced three voucher awards for the 19.3 cycle in a record time of seven weeks from proposal submission to close.

The GAIN team attended the ARWG meeting at NEI on June 6, 2019.

The GAIN team participated in the ANS Annual Meeting in Minneapolis, Minnesota.

John Jackson, Lori Braase and Andrew Worrall attended the DOE Nuclear Energy Enabling Technologies Strategic Planning Session in Germantown, Maryland.

JUL

The Fast Reactor Technology Working Group held a workshop at ANL in Chicago, Illinois.

A small team of national laboratory subject matter experts provided a training session on modular high-temperature, gas-cooled reactor technology to a large group of technical staff at NRC.

Following the publication of a white paper, "Redefining Nuclear Security in an Advanced Nuclear Age–Can the U.S. Regain Security Leadership?" in July 2018, Third Way continued to engage with advanced reactor developers on topics around safeguards and security. Andrew Worrall was invited by Third Way to be part of a resource council to support U.S. industry.

ORNL hosted the 2019 Modeling, Experimentation and Validation School, in part supported by GAIN.

The first edition of the GAIN University Directory was released.

John Jackson provided an overview and update on the GAIN initiative at the Light Water Reactor Sustainability (LWRS) program's Enhanced Resilient Plant workshop.

AUG

EPRI submitted the topical report, "Uranium Oxycarbide (UCO) Tristructural Isotropic (TRISO) Coated Particle Fuel Performance," to NRC on May 31, 2019. The safety evaluation could be issued sometime in 2020. The NRC issued a letter to Dr. David Scott, EPRI, stating, "The NRC staff has performed an acceptance review of the topical report and found that it contains sufficient information to enable the staff to complete a detailed technical review."

Ihsan Yuksel, GAIN's 2019 intern, spent the summer at INL collecting data using Integrated Resource Plans from utility companies in Virginia, North Carolina, South Carolina, Colorado, Wyoming, Utah and Texas.

GAIN partnered with Generation Atomic to host Atomic week, which featured clean energy workshops, trainings and games to INL employees and the surrounding Idaho Falls community.

Lori Braase attended the Structural Mechanics in Reactor Technology Conference in Charlotte, North Carolina.

John Jackson was invited to speak at the ARPA-E Fusion workshop to provide details on the GAIN initiative.

John Jackson chaired the 19th Environmental Degradation of Materials in Nuclear Power Systems – Water Reactors conference in Boston, Massachusetts.

John Jackson attended the USNIC Ready4Nuclear Deployment Pacific Northwest Workshop at Pacific Northwest National Laboratory (PNNL) as an invited speaker.

SEP

The GAIN team, John Jackson, Lori Braase and Teresa Krynicki, attended the 2019 Global/Top Fuel Conference in Seattle, Washington.

NRC completed its initial review of ANL's May 2019 submittal of "Quality Assurance Program Plan for SFR Metallic Fuel Data Qualification," provided a small group of clarifying questions, and discussed resolution of those topics with the ANL staff.

Lori Braase and Teresa Krynicki attended the Energy Policy Research Conference in Boise, Idaho. GAIN supported the conference with an exhibit booth.

BY THE NUMBERS

A full range of methods is used to respond, communicate and collaborate with an expanding list of nuclear energy stakeholders. Therefore, it is crucial that GAIN reach audiences and stakeholders through funding and communications methods. These numbers reflect GAIN's impact for FY 2019.

COMMUNICATIONS

During FY 2019, GAIN was invited to speak at more than

51 workshops, meetings and events.

8 industry-facing workshops were organized and executed by GAIN. The workshops included the NSUF Industry Advisory Meeting, Molten Salt Reactor Workshop, Advanced Manufacturing for Nuclear, EPRI Construction Economics, Advanced Fuels, Microreactors, Fast Reactors and Atomic Week. These workshops provided venues for industry and national laboratories to connect and develop relationships that foster creative and innovative solutions to move industry toward commercialization.

OUTREACH

Since January 2016, GAIN impacted companies, universities, government entities, etc., through workshops, directories, vouchers and industry Funding Opportunity Announcements (iFOA), including

198
Individual Companies (Industry)

79
Universities, Government Entities, etc.

277
Total Organizations

GAIN NE VOUCHERS

Vouchers continue to foster critical, enduring technical relationships between DOE laboratories and the nuclear industry to enable the accelerated commercialization of innovative technology.

20
Vouchers Completed

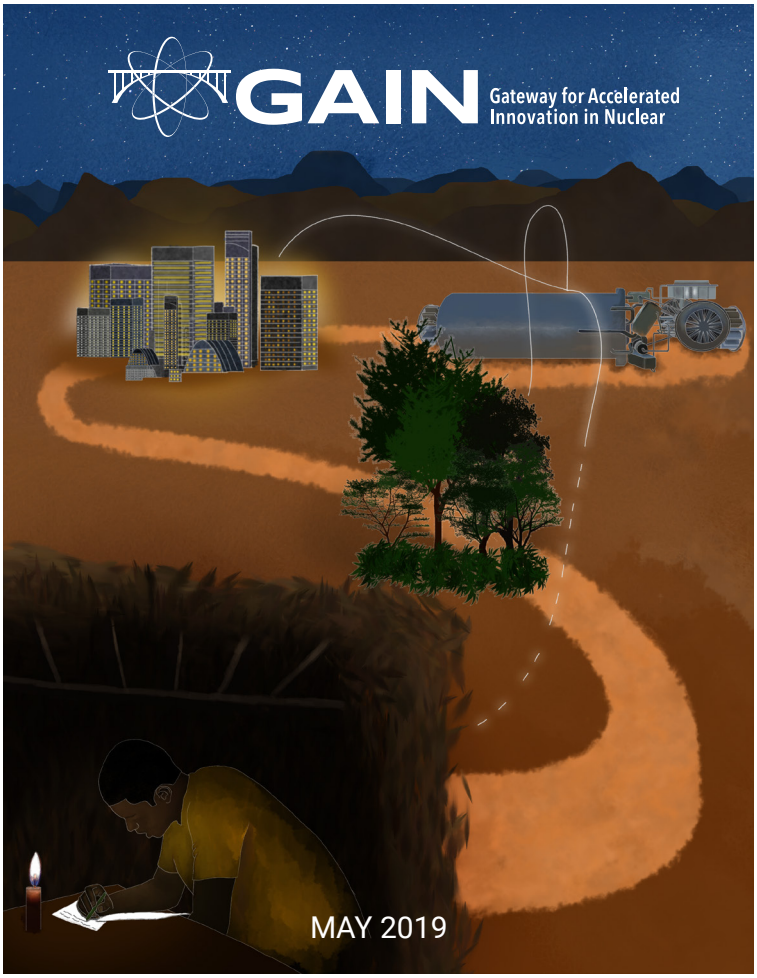
45
Organizations Awarded Vouchers

$14.7M
to National Laboratories

$18.4M
Total Project Costs

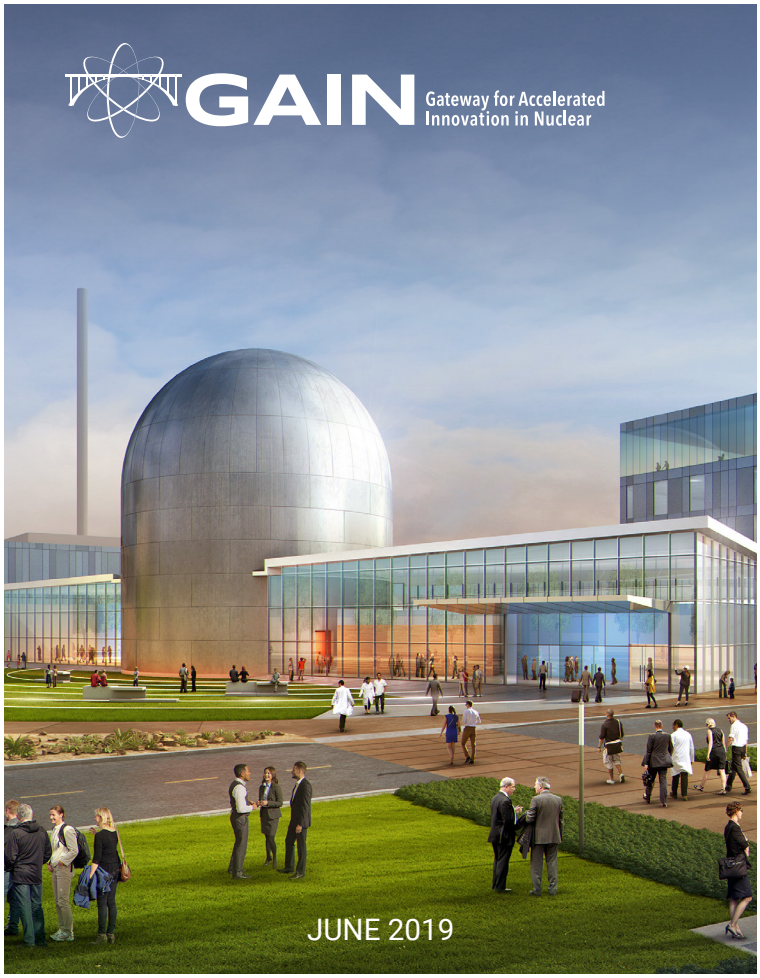
2019 Significant Milestones

GAIN events, outreach, awards and actions that marked significant development are worth noting. Significant milestones for FY 2019 include but are not limited to the Student Design Showcase, Microreactor Workshop, Atomic Week and Vouchers.



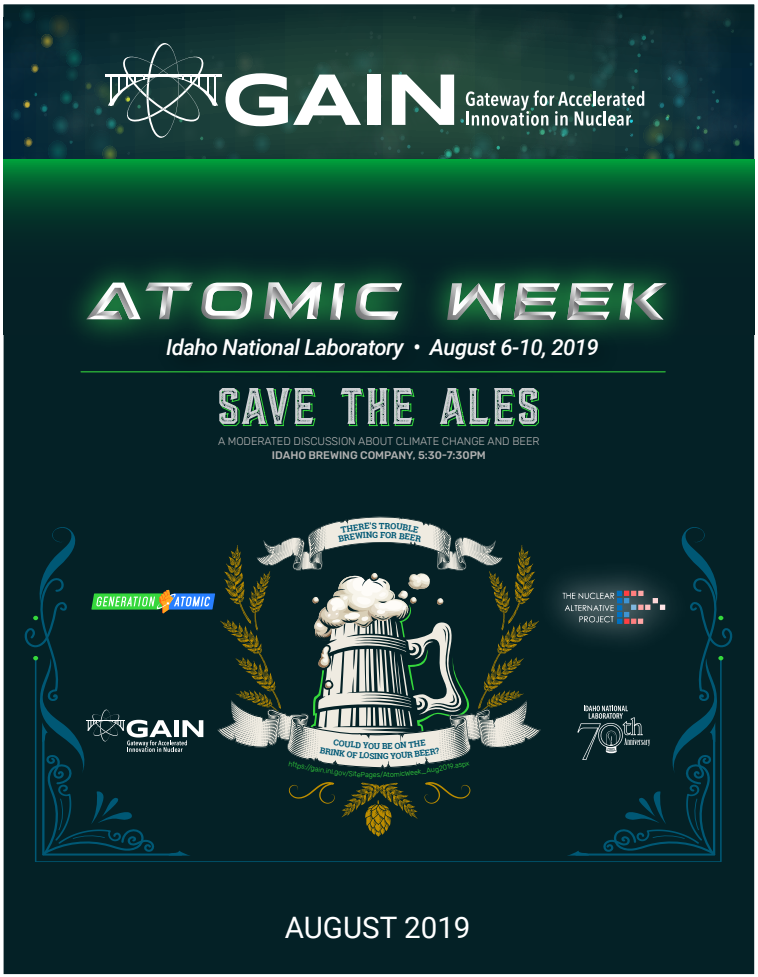
Student Design Showcase

Students were asked to show off their creativity and STEAM talents while depicting a future with microreactors.



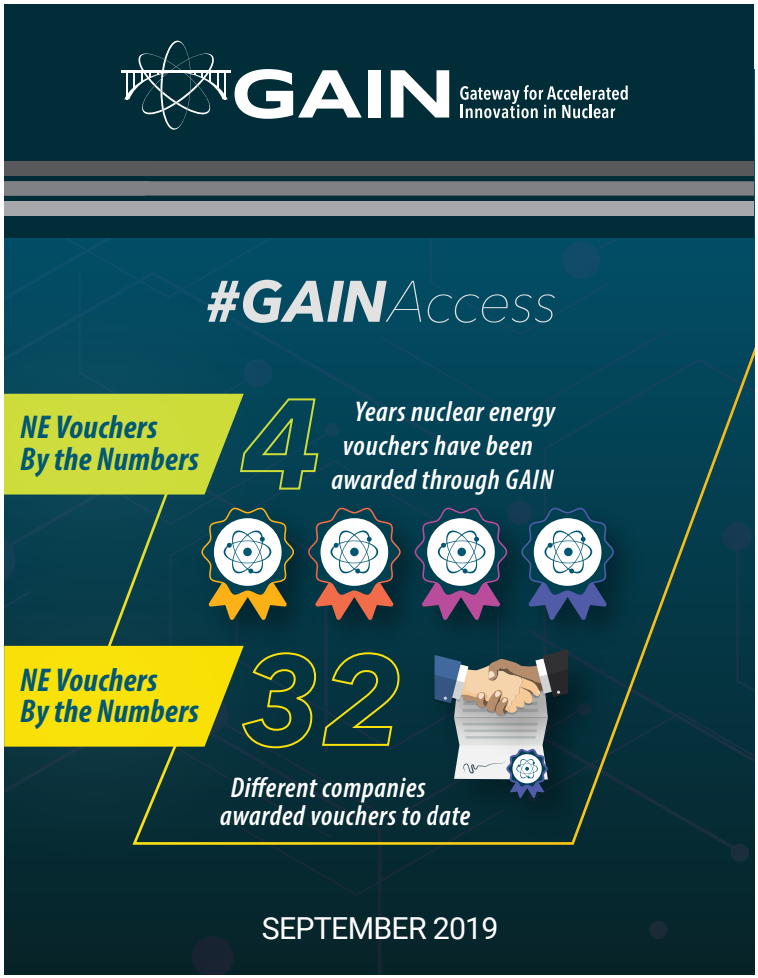
Microreactor Workshop

The microreactor industry gathered to understand special application areas' unique needs.



Advocacy Training

Provided nuclear energy learning opportunities and engaging outreach activities to a diverse audience.



GAIN Vouchers

NE Vouchers continue to provide industry with access to unique research capabilities and lab expertise.

Facets of GAIN

GAIN is a partnership mechanism aimed at accelerating commercialization of advanced nuclear energy technologies. Each of these components represents a part of the advanced nuclear ecosystem that GAIN influences, supports and impacts.

“Inaction breeds doubt and fear. Action breeds confidence and courage. If you want to conquer fear, do not sit home and think about it. Go out and get busy.”

–Dale Carnegie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